22-25, and 27-30, 32, and 34 are now pending in this application.

REJECTION OF CLAIMS 1, 3-4, and 31 UNDER 35 U.S.C. § 102

Invention of claim 1 pertains to an apparatus in which each of two different X-ray detectors are configured to detect X-rays having characteristic X-ray emission levels of a respective layer of material in a film stack. The invention of claim 1 is versatile in that measurements can be taken for more than one layer during a single measurement process.

In contrast, Soezima discloses a system for measuring the state of an element. See Abstract. Stated explicitly, Soezima takes measurements for a single element with respect to its state. Multiple detectors 18 and 20 are used because each state has a different characteristic wavelengths. It is respectfully submitted that Soezima discloses two detectors for measuring the state of a single layer of a single material, but it does not disclose two detectors that each measure information about a respective layer of material. Also, there is nothing in Soezima that teaches or suggests two detectors for measuring information about two different layers of material. As a result, Soezima fails to teach or suggest claim 1. Since claim 4 depends from claim 1, it is submitted that dependent claim 4 is likewise patentably distinct from Soezima for at least the same reasons.

REJECTION OF CLAIMS UNDER 35 U.S.C. §103

It is respectfully submitted that no motivation to combine Soezima and Wallace et al. exists because Wallace et al. discloses information that solves very unrelated problems with respect to the claimed invention. On one hand, the claims of the present invention pertain to inspecting semiconductor wafer samples. On the other hand, Wallace et al. pertains to analyzing respirable dust particles to determine the presence of hazardous components in the surface of the dust particles. See abstract. Since the invention and Wallace et al. are aimed to solve different problems in very unrelated fields, that is the semiconductor industry versus the health field, there is no motivation to use Wallace et al. as a reference to show the unpatentability of the claimed invention.

Furthermore, assuming that there is motivation to combine Wallace et al. with Soezima, these references would still fail to support a case of prima facie obviousness because each reference does not teach or suggest all of the elements of independent claims 1, 11, 21, and 26. Specifically, Wallace et al. and Soezima do not teach or suggest the use of two detectors that

each measure information about a respective layer of material. With respect to Soezima, the lack of such teachings are discussed in the discussion of the 102 rejection above. With respect to Wallace et al., it is respectfully submitted that Wallace et al. does not disclose any information about apparatuses used to detect X-rays, let alone the use of two detectors for measuring information about respective layers of material.

Therefore it is submitted that Soezima and Wallace et al., alone or in any combination, do not teach or suggest the features of the claimed invention. Therefore, it is submitted that claims 1, 11, 21, and 26 are patentably distinct from the cited references. It is submitted that dependent claims 2, 4, 6-9, 12, 14-18, and 22-25, and 27-30, 32, and 34 are also patentably distinct from Soezima and Wallace et al. for at least the same reasons as those recited above for their corresponding independent claims. These dependent claims further recite additional limitations that further distinguish these dependent claims from the cited references. Thus, it is respectfully requested that the Examiner withdraw the rejection of claims 1-4, 6-9, 11-18, and 21-34 under 35 U.S.C §§ 102 and 103(a).

SUMMARY

It is respectfully submitted that all pending claims are allowable and that this case is now in condition for allowance. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

If any fees are due in connection with the filing of this Amendment, the Commissioner is authorized to deduct such fees from the undersigned's Deposit Account No. 500388 (Order No. KLA1P012).

Respectfully submitted,
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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

Please **REWRITE** claims 1, 11, 21, and 26 as follows:

1. (Twice Amended) An apparatus for measuring film stack characteristics of a sample, the apparatus comprising:

a beam generator configurable to direct a charged particle beam towards the sample such that the charged particle beam penetrates at least two layers of the film stack, the charged particle beam causing X-rays to emanate from the sample; and

a first and a second wavelength dispersive X-ray detector positioned above the sample wherein each detector detects X-rays about a different characteristic emission level, **wherein the first detector is configured to detect X-rays having characteristic emission levels for a top layer of the film stack and the second detector is configured to detect X-rays having characteristic emission levels for an underlying layer that lies beneath the top layer [wherein the X-rays emanate from the sample]**.

11. (Twice Amended) A method for measuring at least one characteristic of a film stack on a sample, the method comprising:

directing a charged particle beam towards the sample such that the charged particle beam penetrates at least two layers of the film stack, the charged particle beam causing X-rays to emanate from the sample; **[and]**

detecting X-rays at a first characteristic emission level that represents an emission level for a top layer of the film stack using a first wavelength dispersive X-ray detector that is positioned above the sample; and

detecting X-rays at a second characteristic emission level that represents an emission level for an underlying layer of the film stack using a second wavelength dispersive X-ray detector that is positioned above the sample, the underlying layer being a layer of material underneath the top layer

[detecting at least a portion of the X-rays emanating from the sample about two different characteristic emission levels using a first and a second wavelength dispersive X-ray detector which are positioned above the sample].

21. (Once Amended) A method of determining film stack characteristic values of a sample, the method comprising:

obtaining raw data related to the film stack characteristic values from a **first** wavelength dispersive **detector [system]** which detects X-rays emanating from **a first layer of** the sample;

selecting a set of estimated film stack characteristic values;

obtaining predicted data by solving equations which model a film stack configuration using the set of estimated film stack characteristic values;

comparing the predicted data against the raw data;

selecting a new set of estimated film stack characteristic values when the difference between the predicted data and the raw data is larger than a predetermined margin of error; **[and]**

obtaining a new set of predicted data by solving equations which model the film stack configuration using the new set of estimated film stack characteristic values when the difference between the predicted data and the raw data is larger than the predetermined margin of error; **and**

repeating the above operations using a second wavelength dispersive detector to detect X-rays emanating from a second layer of the sample.

26. (Once Amended) A computer-readable medium comprising computer code for determining film stack characteristic values of a sample, the computer-readable medium comprising:

obtaining raw data related to the film stack characteristic values from a **first** wavelength dispersive **detector [system]** which detects X-rays emanating from **a first layer of** the sample;

selecting a set of estimated film stack characteristic values;

obtaining predicted data by solving equations which model a film stack configuration using the set of estimated film stack characteristic values;

comparing the predicted data against the raw data;

selecting a new set of estimated film stack characteristic values when the difference between the predicted data and the raw data is larger than a predetermined margin of error; **[and]**

obtaining a new set of predicted data by solving equations which model the film stack configuration using the new set of estimated film stack characteristic values when the difference between the predicted data and the raw data is larger than the predetermined margin of error; **and**

repeating the above operations using a second wavelength dispersive detector to detect X-rays emanating from a second layer of the sample.